

A Ground-based Comparison of the Muscle Atrophy Research and Exercise System (MARES) and a Standard Isokinetic Dynamometer

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PURPOSE: 1) To compare the test-to-test reliability of MARES with a standard laboratory isokinetic dynamometer (ISOK DYN) and; 2) to determine if measures of peak torque and total work differ between devices.

METHODS: Ten subjects (6M, 4F) completed two trials on both MARES and an ISOK DYN in a counterbalanced order. Peak torque values at 60° & $180^\circ \cdot s^{-1}$ were obtained from five maximal repetitions of knee extension (KE) and knee flexion (KF). Total work at $180^\circ \cdot s^{-1}$ was determined from the area under the torque vs. displacement curve during twenty maximal repetitions of KE and KF. Reliability of measures within devices was interpreted from the intraclass correlation coefficient (ICC) and compared between devices using the ratio of the within-device standard deviations. Indicators of agreement for the two devices were evaluated from: 1) a calculation of concordance (ρ) and; 2) the correlation between the mean of measures versus the delta difference between measures (μ vs. Δ).

RESULTS: For all outcome measures ICCs were high for both the ISOK DYN (0.95-0.99) and MARES (0.90-0.99). However, ratios of the within-device standard deviation were 1.3 to 4.3 times higher on MARES. On average, a wide range (3.3 to 1054 Nm) of differences existed between the values obtained. Only KE peak torque measured at 60° & $180^\circ \cdot s^{-1}$ showed similarities between devices ($\rho = 0.91$ & 0.87 ; Pearson's r for μ vs. $\Delta = -0.22$ & -0.37 , respectively).

CONCLUSION: Although MARES was designed for use in microgravity it was quite reliable during ground-based testing. However, MARES was consistently more variable than an ISOK DYN. Future longitudinal studies evaluating a change in isokinetic peak torque or total work should be limited within one device.